

What is claimed is:

1        1. A liquid separator for a gas analyzer, said  
2 liquid separator comprising:  
3        a closed container including a sample inlet port,  
4 a sample outlet port, and a low pressure port;  
5        said container defining a liquid collection  
6 chamber;  
7        a liquid trap filter chamber integral with said  
8 container, said liquid trap filter chamber including  
9 an inlet compartment interposed between said sample  
10 inlet port and said sample outlet port for receiving a  
11 gas sample introduced into said sample inlet port,  
12 said inlet compartment having an upper outlet  
13 communicated with said sample outlet port and a lower  
14 outlet communicated with said liquid collection  
15 chamber; and  
16        a liquid trap filter element contained in said  
17 inlet compartment interposed between said sample inlet  
18 port and said sample outlet port for separating liquid  
19 from the gas sample, liquid separated from the gas  
20 sample passing through said lower outlet to said  
21 collection chamber.

1        2. The liquid separator according to claim 1,  
2 wherein said inlet compartment includes a barrier  
3 interposed between said filter element and said sample  
4 outlet port, said barrier defining said upper outlet.

1        3. The liquid separator according to claim 2,  
2 wherein said liquid trap filter chamber includes a  
3 cover which encloses said filter element within said  
4 inlet compartment.

1        4. The liquid separator according to claim 3,  
2 wherein said cover includes at least one concave  
3 filter engaging surface engaging said filter element  
4 to trap said filter element between said cover and  
5 said barrier.

1        5. The liquid separator according to claim 1,  
2 wherein said filter element comprises a membrane  
3 bearing a polytetrafluoroethylene laminate.

1        6. The liquid separator according to claim 1,  
2 wherein said liquid trap filter chamber includes an  
3 outlet compartment interposed between said collection  
4 chamber and said low pressure port, said outlet  
5 compartment having an inlet communicated with said  
6 collection chamber and an outlet communicated with  
7 said low pressure port, and a second liquid trap  
8 filter element contained in said outlet compartment  
9 interposed between said inlet and said outlet of said  
10 outlet compartment.

1        7. The liquid separator according to claim 6,  
2 wherein said outlet compartment includes a barrier  
3 interposed between said second filter element and said  
4 low pressure port, said barrier defining said outlet  
5 port of said outlet compartment.

1        8. The liquid separator according to claim 6,  
2 wherein said second filter element comprises a  
3 membrane bearing a polytetrafluoroethylene laminate.

1        9. The liquid separator according to claim 1,  
2 and including a self-sealing filter in at least one of  
3 said sample outlet port and said low pressure port.

1        10. A liquid separator for a gas analyzer, said  
2 liquid separator comprising:  
3        a sample inlet port;  
4        a sample outlet port;  
5        an inlet compartment having an inlet in fluid  
6 communication with said sample inlet port for  
7 receiving a gas sample introduced into said sample  
8 inlet port, said inlet compartment having an upper  
9 outlet communicated with said sample outlet port;  
10        a liquid collection chamber in fluid  
11 communication with said inlet compartment for  
12 receiving liquid from said inlet compartment;  
13        a low pressure port;  
14        an outlet compartment interposed between said  
15 collection chamber and said low pressure port, said  
16 outlet compartment having an inlet communicated with  
17 said collection chamber and an outlet communicated  
18 with said low pressure port; and  
19        a gas permeable, liquid impermeable filter  
20 element contained in one of said inlet compartment and  
21 said outlet compartment, interposed between said inlet  
22 and outlet of said one compartment for substantially  
23 preventing flow of liquid while allowing the flow of  
24 gas from said inlet to said outlet of said one  
25 compartment.

1        11. The liquid separator according to claim 10,  
2 wherein said filter element is contained in said inlet  
3 compartment interposed between said sample inlet port  
4 and said upper outlet for separating liquid from the  
5 gas sample.

1        12. The liquid separator according to claim 10,  
2 wherein said filter element is contained in said  
3 outlet compartment interposed between said inlet of  
4 said outlet compartment and said outlet of said outlet  
5 compartment for substantially preventing the passage  
6 of liquid through said outlet compartment to said low  
7 pressure port.

1        13. The liquid separator according to claim 10,  
2 wherein at least said one compartment includes a cover  
3 separating said inlet and outlet compartments.

1        14. A liquid separator according to claim 10,  
2 wherein said filter element comprises a membrane  
3 bearing a polytetrafluoroethylene laminate.

1        15. The liquid separator according to claim 10,  
2 including a self-sealing filter in at least one of  
3 said sample outlet port and said low pressure port.

1        16. A liquid separator for a gas analyzer, said  
2 liquid separator comprising:  
3            a sample inlet port;  
4            a sample outlet port;  
5            an inlet compartment having an upper outlet  
6 communicated with said sample outlet and a lower  
7 outlet communicated with said collection chamber;  
8            a gas permeable, liquid impermeable filter  
9 element contained in said inlet compartment interposed  
10 between said sample inlet port and said upper outlet  
11 for separating liquid from the gas sample;  
12            said inlet compartment including a barrier  
13 interposed between said filter element and said sample

14 outlet port, said barrier defining said upper outlet;  
15 and

16 a liquid collection chamber for receiving liquid  
17 passed through said lower outlet of said inlet  
18 compartment.

1 17. The liquid separator according to claim 16,  
2 including an outlet compartment interposed between  
3 said collection chamber and said low pressure outlet,  
4 said outlet compartment having an inlet communicated  
5 with said collection chamber and an outlet  
6 communicated with said low pressure port, and a second  
7 gas permeable, liquid impermeable filter element  
8 contained in said outlet trap filter compartment  
9 interposed between said inlet and said outlet of said  
10 outlet trap filter compartment.

1 18. The liquid separator according to claim 17,  
2 wherein said first-mentioned and said second filter  
3 elements each comprises a membrane bearing a  
4 polytetrafluoroethylene laminate.

1 19. A liquid separator for a gas analyzer, said  
2 liquid separator comprising:  
3 a sample inlet port;  
4 a sample outlet port;  
5 a liquid collection chamber;  
6 a separation compartment for separating liquid  
7 from the gas sample, said separation compartment  
8 having an upper outlet communicated with said sample  
9 outlet port and a lower outlet communicated with a  
10 collection chamber;  
11 a low pressure port; and

12        an outlet compartment interposed between said  
13    collection chamber and said low pressure port, said  
14    outlet compartment having an inlet communicated with  
15    said collection chamber and an outlet communicated  
16    with said low pressure port, and a gas permeable,  
17    liquid impermeable filter element contained in said  
18    outlet compartment interposed between said inlet and  
19    said outlet of said outlet compartment.

1        20. A liquid separator for a gas analyzer, said  
2    liquid separator comprising:  
3        a sample inlet port;  
4        a sample outlet port;  
5        an inlet compartment for receiving a gas sample  
6    introduced into said sample inlet port, said inlet  
7    compartment having an upper outlet communicated with  
8    said sample outlet port and a lower outlet  
9    communicated with said collection chamber;  
10        a first gas permeable, liquid impermeable filter  
11    element contained in said inlet compartment interposed  
12    between said sample inlet port and said upper outlet  
13    for separating liquid from the gas sample;  
14        a liquid collection chamber receiving liquid  
15    passed through said lower outlet of said inlet trap  
16    filter compartment;  
17        a low pressure port;  
18        an outlet compartment interposed between said  
19    collection chamber and said low pressure port, said  
20    outlet compartment having an inlet communicated with  
21    said collection chamber and an outlet communicated  
22    with said low pressure port; and  
23        a second gas permeable, liquid impermeable filter  
24    element contained in said outlet compartment

25 interposed between said inlet and said outlet of said  
26 outlet compartment.

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